—Standard Valves—

4316-A VALVE

TRIODE.

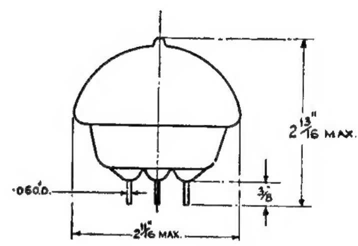
SPECIFICATION.

Cathode.

Thoriated Tungsten filament.
Constant voltage type.

Mounting.

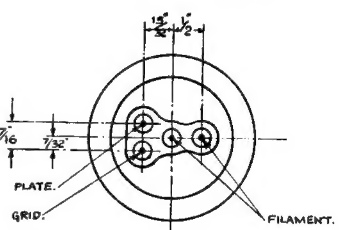
The grid, anode and filament leads are tungsten rods projecting from a flat face of the bulb. The valve may be supported by these leads providing flexibility is maintained so that no glass strains are produced. It is recommended that small brass or copper sleeves equipped with set screws be used for connectors. Soldering direct to the rods should not be attempted.





Dimensions.

Overall length	$2\frac{13}{16}$" (7·1 cms.)
Diameter	$2\frac{11}{16}$" (6·8 cms.)
Net weight	0·12 lbs. (55 gms.)



Constants.

Filament voltage	2 volts
Nominal filament current	3·65 amps.
Amplification factor	6·5
Impedance	2,700 ohms
Mutual conductance	2·4 mA. per volt
Grid–anode capacity	1·6 $\mu\mu$F.
Anode–filament capacity	0·8 $\mu\mu$F.
Grid–filament capacity	1·2 $\mu\mu$F.

LIMITING CONDITIONS FOR SAFE OPERATION.

Maximum direct anode voltage	450 volts
Maximum direct anode current	0·080 amps.
Maximum direct grid current	0·012 amps.
Maximum anode dissipation	30 watts

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TYPICAL OPERATING CONDITIONS.

	Class C Telephony	Class C Telegraphy
	Subject to anode modulation	Unmodulated
Direct anode voltage	400	450 volts
Direct anode current	80	80 mA.
Direct grid current	12	12 mA.
Carrier output	6·5	7·5 watts

Ultra High Frequency Operation.

When the 4316-A valve is used at frequencies above 300 megacycles, several precautions must be observed in the circuit design in order to obtain good efficiency. It is necessary to provide tuning in the filament to ground circuit. The use of adjustable concentric lines of approximately $\frac{3}{8}$ wavelength for each filament lead is probably the most satisfactory method. It is also desirable to avoid the use of dielectric material as much as possible and to confine that which is necessary for mounting circuit elements to points of low r.f. voltage. The grid and anode supply leads should be connected at nodal points if possible. A schematic of an oscillator circuit which will function at frequencies as high as 600 megacycles is shown. For operation at 500 megacycles, the area enclosed by the circuit A should be about $1\frac{1}{2}$ square inches outside of the valve envelope and the capacity about 1·75 mmF. It is important that a reference ground such as a sheet of copper underneath the circuit, or a copper box enclosing the circuit be used and that by-passes be made directly to this ground with as short leads as possible.

When the circuit is operated initially, the following procedure should be observed.

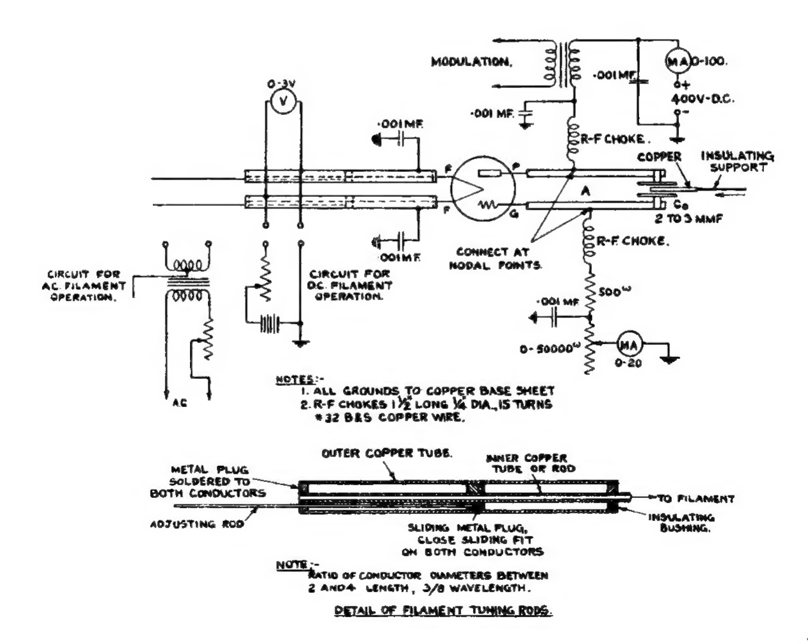
Place a 1,000 ohm resistor in series with the anode supply source. Apply 2·0 volts to the filament and with the grid leak set at 15,000 ohms apply anode voltage and adjust the filament tuning for greatest amplitude of oscillation as evidenced by the highest grid current. However, the grid current should not

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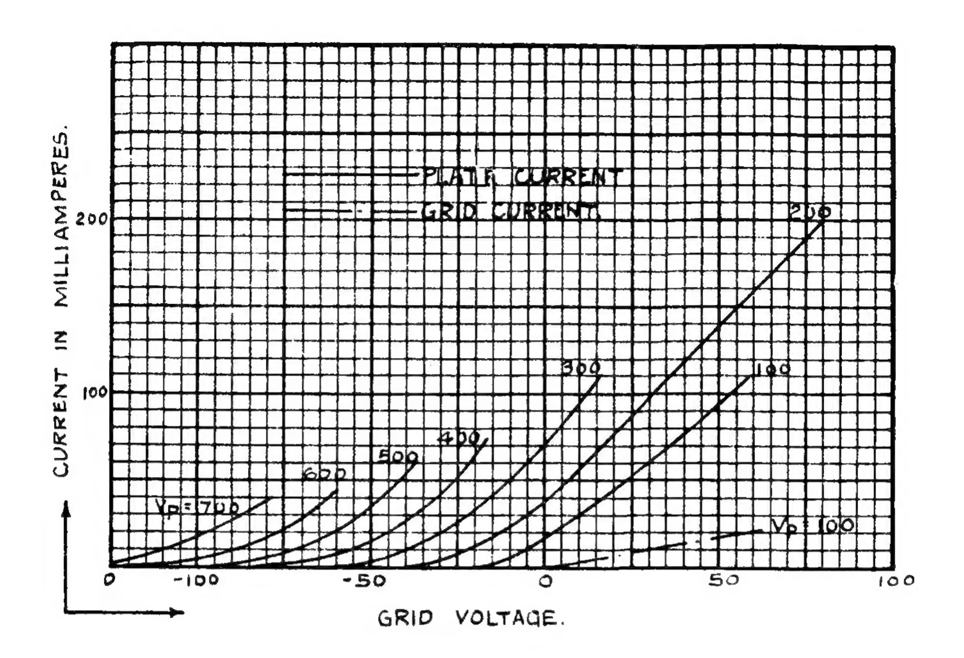
be allowed to exceed 12 milliamperes. Measure the wavelength and adjust the tuning condenser, correcting the filament tuning at the same time, until the circuit oscillates at the desired wavelength. Couple the load inductively, remove the 100 ohm resistor from the anode supply, and adjust the filament tuning and grid leak for best output at rated input of 80 milliamperes. The load coupling and filament tuning will both be found fairly critical for best efficiency.

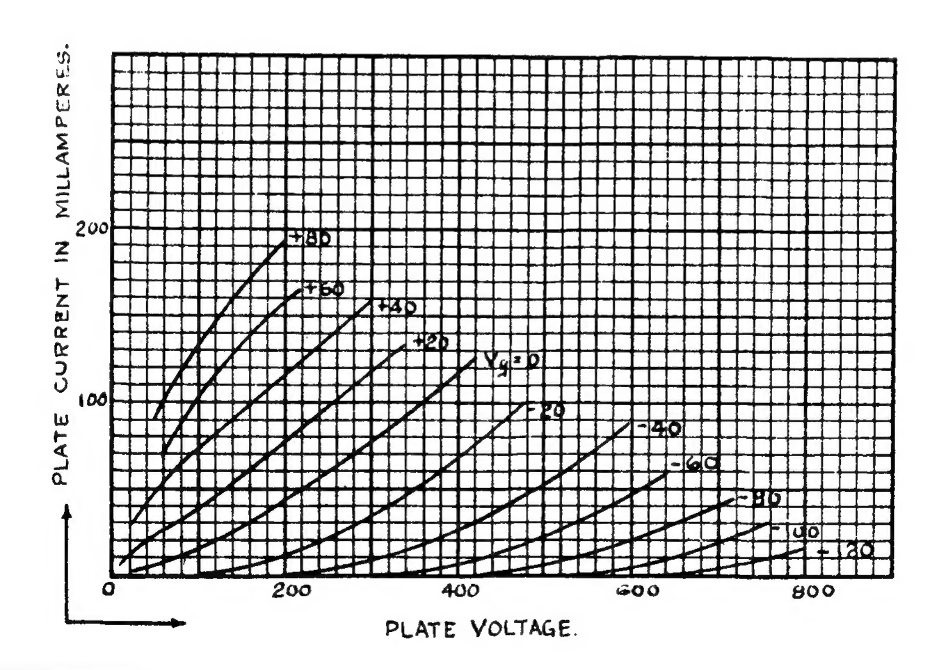
The following table indicates the nominal output obtainable from a 4316-A valve as an unmodulated oscillator with an input of 400 volts and 80 milliamperes d.c.

Frequency—Mc.	Power Output— watts
300	8·5
400	8·0
500	6·5
600	4·0
750	Limit of oscillation.



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